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Chapter 18: Cross Sections

Overview

Proposed Cross Sections are used to determine the limits of construction, earthwork, construction staking reports, and 3D modeling. It is very important that they are drawn consistently and to the standards outlined in this chapter. Federal Lands Highway (FLH) has developed a new generation of criteria files know as the X30 criteria files. With the development of the X30 criteria, creating the proposed cross sections no longer requires the traditional input files and exception data files. With the X30 criteria files, proposed cross sections are created through the Project Manager using the Typical Section Generator. Proper setup and use of the Project Manager is crucial in using the Typical Section Generator to create the proposed cross sections.

Federal Lands Highway have developed **6 Typical Sections** for the use of developing cross sections. The 6 Typical Sections are **Divided New Pavement, Existing Features, Existing and Proposed Right of Way, Rehabilitation Typical Section (3R), Undivided New Pavement and Cross Section Labeling.**

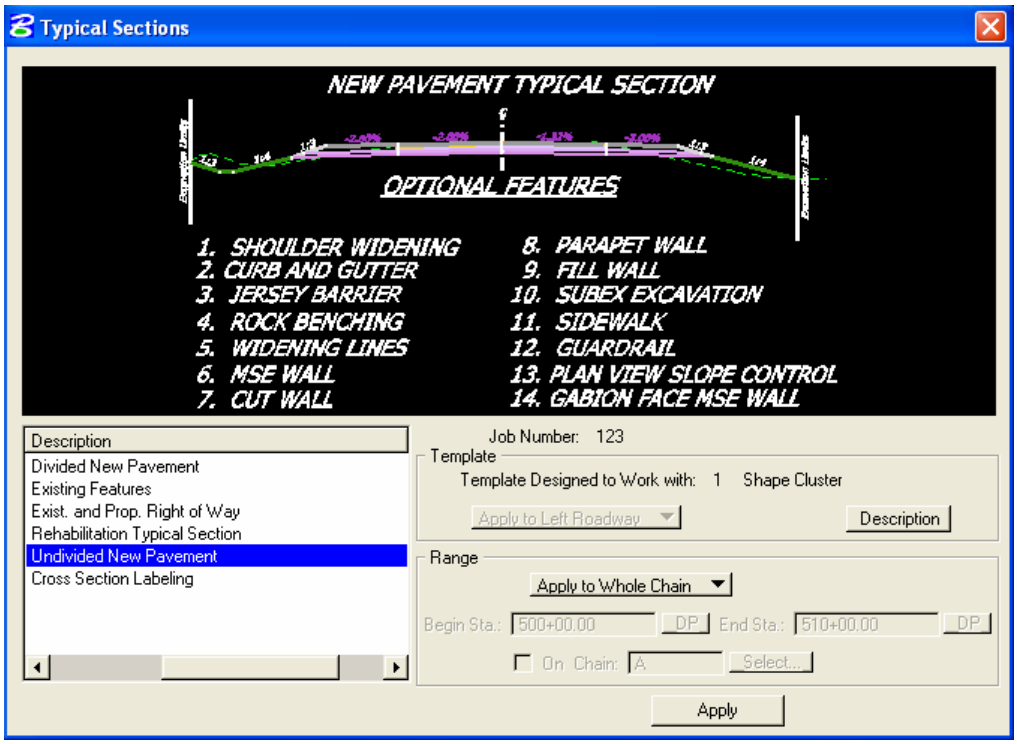

Figure 18-1: FLH Typical Sections

There are many optional features available with the Typical Sections. To use the optional features, Typical Sections looks for elements drawn in plan view that were drawn using Design and Computation Manager and Place Influence to act as a "horizontal" reference lines. Sometimes these elements drawn in plan view represent the exact offset for the corresponding cell to be placed in the cross section file and other times

STANDARDS FOR USE WITH X30 CRITERIA

these elements simply act as an "on/off switch" giving instructions to the criteria.

Prior to running proposed cross sections, the Project Manager need to be setup as outlined in Chapter 13 of the Geopak 2004 - X30 CADD Standards Manual.

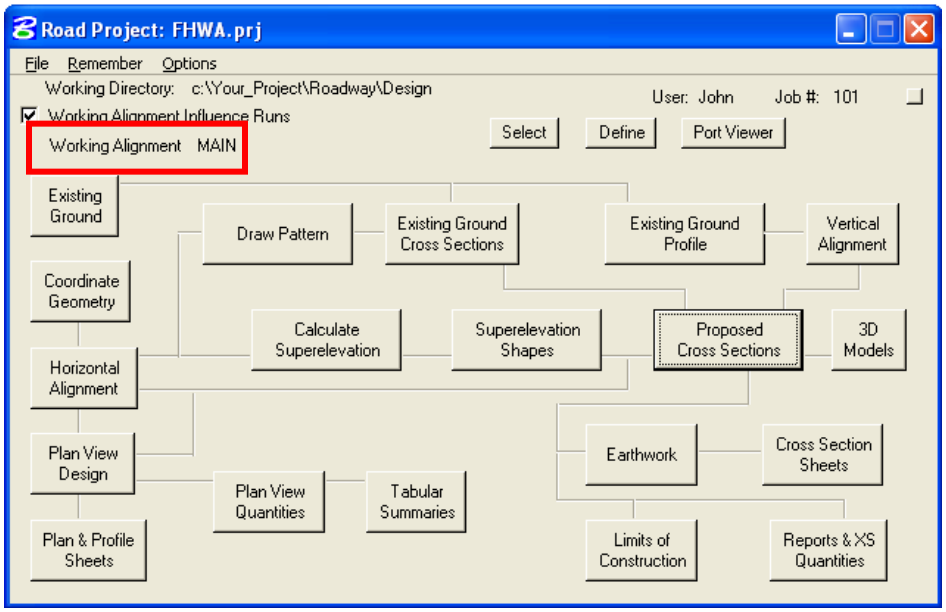

Figure 18-2: Project Manager Workflow Dialog

Once the working alignment has been selected and defined, Proposed Cross Sections can be run through the Project Manager Workflow Dialog Box. Follow Workflow 1 below to setup the Working Alignment Definition. An example Working Alignment called MAIN will be used to outline the Workflows in this Chapter.

Workflow 1: Working Alignment Definition

1. *Select Define button from the Project Manager Workflow Dialog as shown below.*

Figure 18-3: Define Working Alignment

2. *The Working Alignment Definition Dialog Box for the Chain MAIN will appear. In the Plan View category select the proposed design file and select the Geopak alignment chain.*

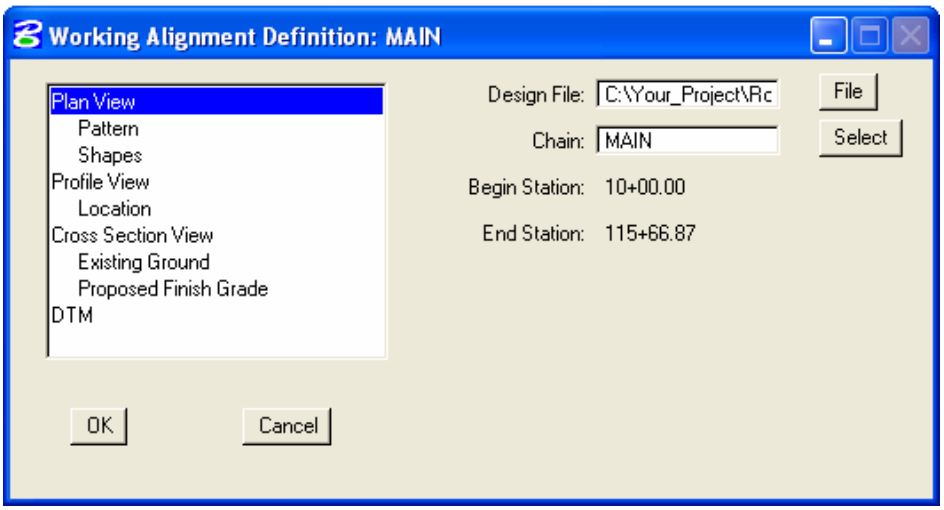

Figure 18-4: Plan View Definition

3. *In the Pattern category populate the dialog By Station or By Design File. Use named levels P_GPK_Pattern_01 to P_GPK_Pattern_10 to place pattern lines in a design file. Horizontal Scale and Vertical Scale should be set to 1.*

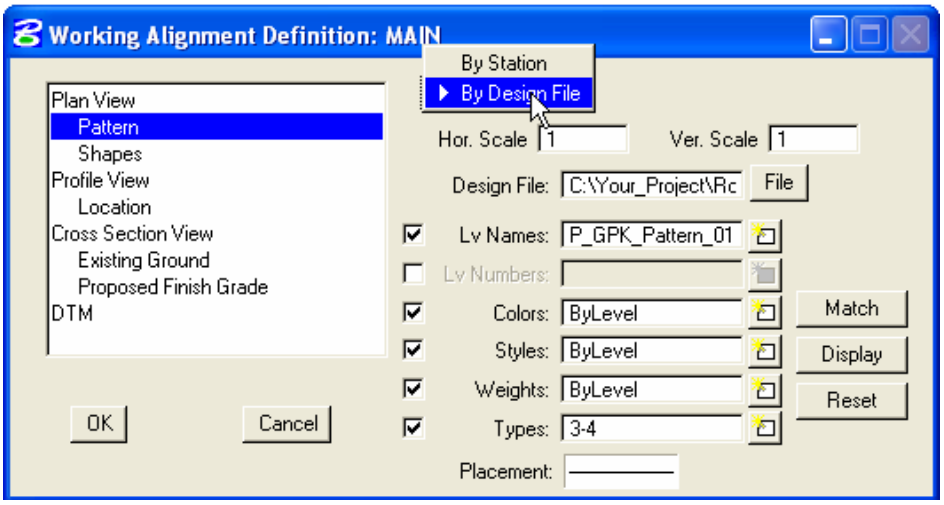

Figure 18-5: Pattern Definition

4. *In the Shapes category populate the dialog By Search Criteria as shown below. Using the Search Criteria mode instead of the All in DGN mode will process the proposed cross sections faster. When drawing superelevation shapes, make sure to define your level symbology, use named level P_RDW_Super_Shapes to draw superelevation shapes in the Shapes dgn file.*

For CFL projects, Superelevation Files (preference files, e files and length files) are accessible from the V8_RESOURCE\X_30\Standards\Bin\English or Metric Directory.

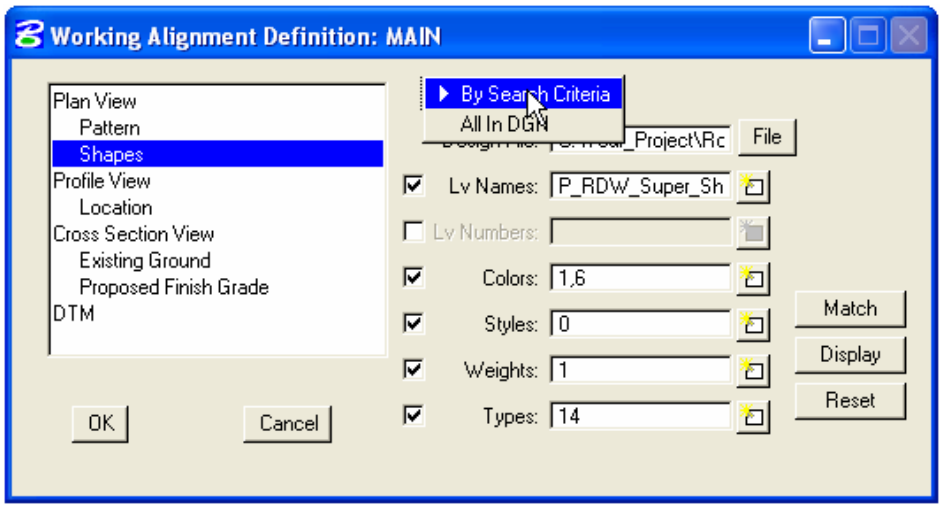

Figure 18-6: Shapes Definition

5. *In the Profile View and Location category populate the dialogs defining your design profile file, existing profile and proposed profiles. Profile Location can be populated by selecting the Identify Cell button and selecting the profile cell. Profile View and Location are not required to be populated to run proposed cross sections.*

6. *In the Cross Section View category populate the dialogs defining your XS DGN file.*

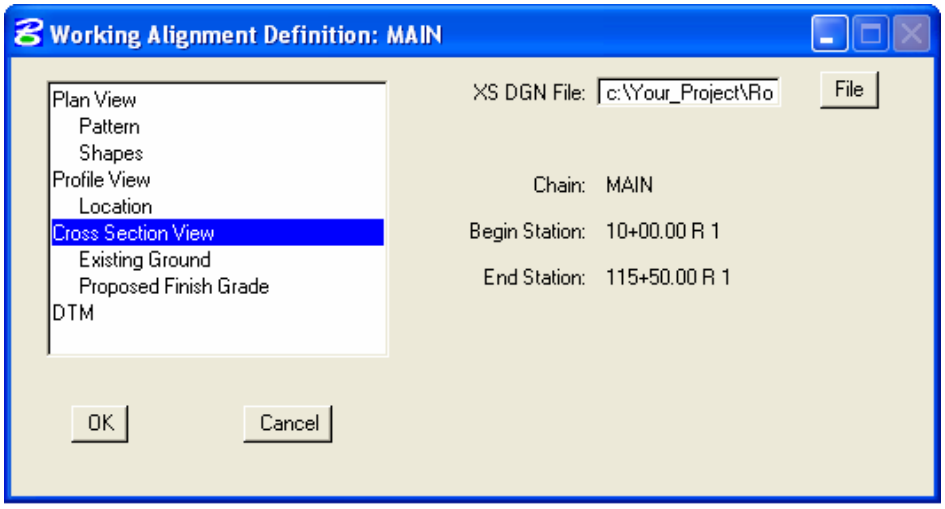

Figure 18-7: Cross Section Definition

7. *In the Existing Ground category populate the dialogs defining the parameters of your existing ground as shown below.*

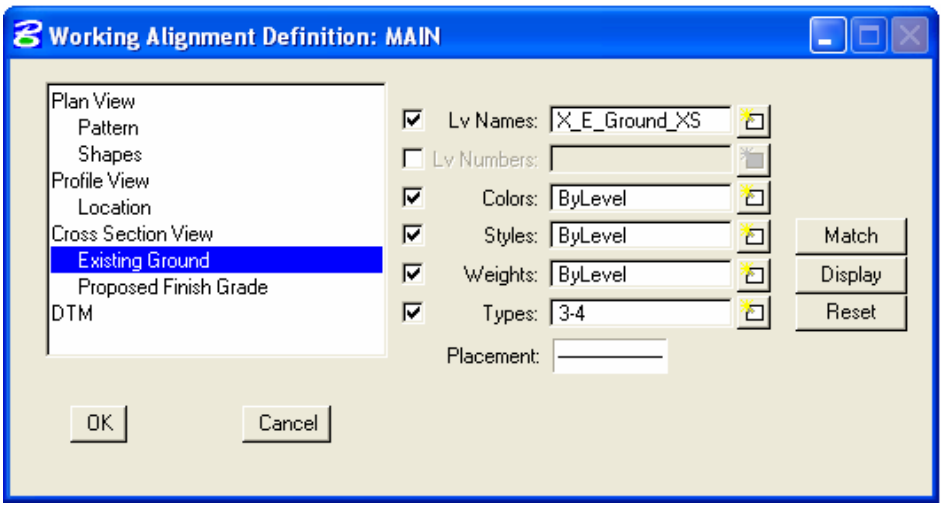

Figure 18-8: Existing Ground Definition

8. *The Proposed Finished Grade and DTM categories should be completed, but they are not required to be populated to run Proposed Cross Sections. Once all the categories in the dialog box are completed, Select OK to save and close the Working Alignment Definition for the working alignment (example: MAIN).*

Once the working alignment definitions are set for a working alignment, Proposed Cross Sections can be selected from the Project Manager Dialog Box. Workflow 2 will outline the steps required to process the Proposed Cross Sections.

Workflow 2: Proposed Cross Sections

1. *Select Proposed Cross Sections button from the Project Manager Workflow Dialog Box.*

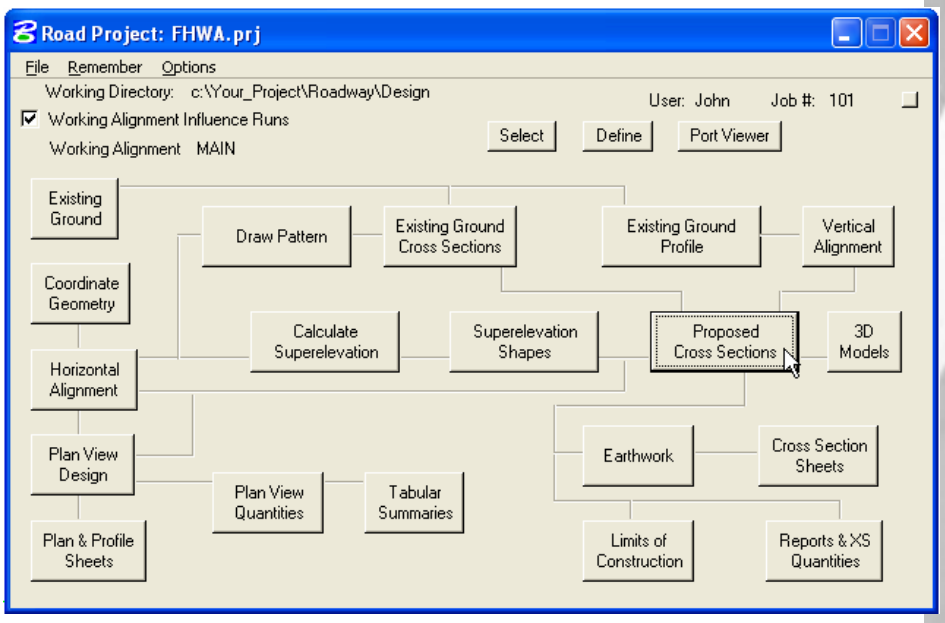

Figure 18-9: Accessing Proposed Cross Sections

2. *The following dialog will be activated, since no run exist for the example Select New to create a Run.*

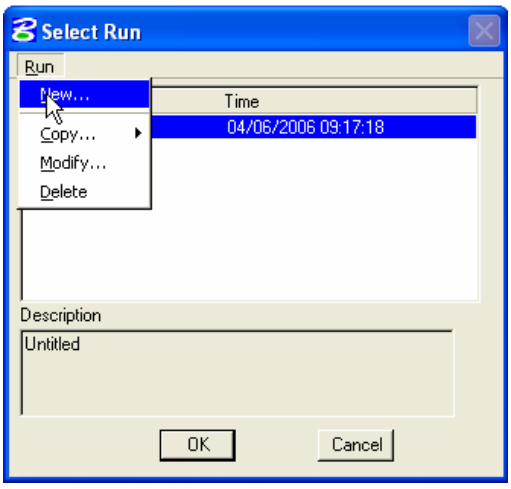

Figure 18-10: Create a New Run

3. *Create a New Run by entering the run name and description and select OK.*

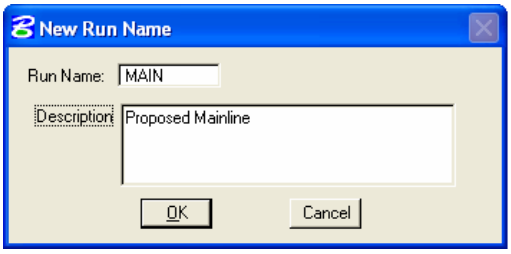

Figure 18-11: New Run

4. *From the Select Run dialog, select the newly created run MAIN and select OK.*

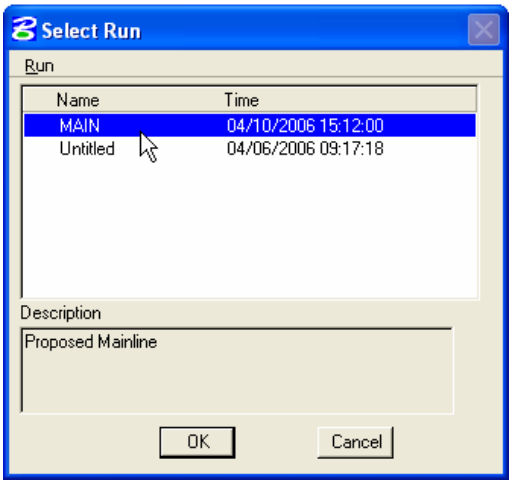

Figure 18-12: Select New Run

5. *Selecting a Run will access the Proposed Cross Section Dialog.*

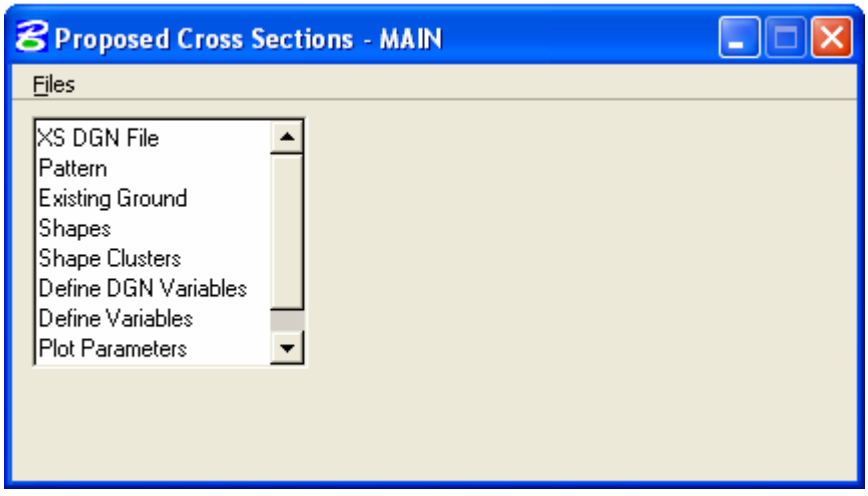

Figure 18-13: Proposed Cross Sections Dialog

The Proposed Cross Section run shown in this workflow will be for an Undivided New Pavement Typical Section.

The proposed Cross section run holds the same information as the old Proposed Cross Section Input File and Exception Data File combined.

6. *Select the XS DGN File from the Proposed Cross Section dialog. Note that the dialog box is already filled in by the Working Alignment definition.*

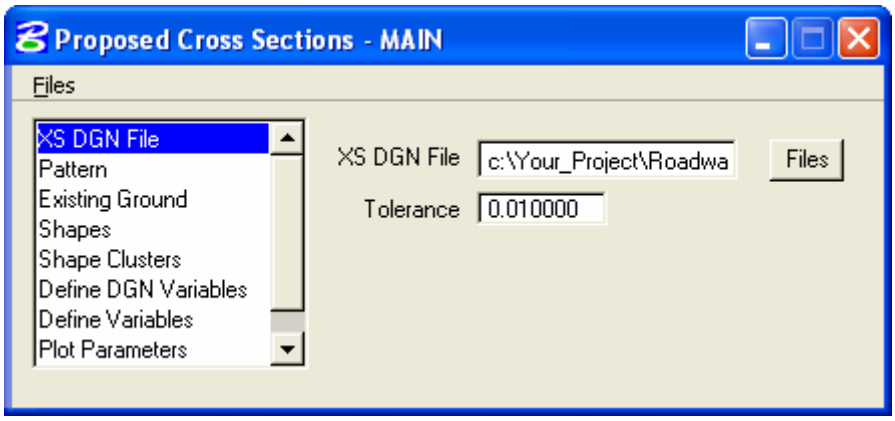

Figure 18-14: Selecting XS DGN File

The tolerance should always be set to 0.01 for English projects and 0.003 for Metric projects. The tolerance setting is very important and the proposed cross section will not process without setting this value.

7. *Select the Pattern and toggle on Use Working Alignment Definition.*

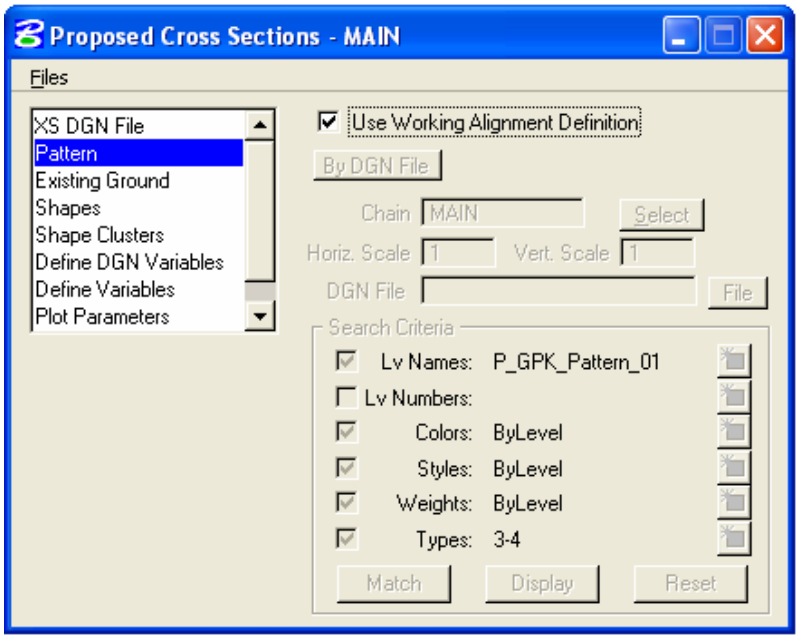

Figure 18-15 Selecting Pattern

8. *Select the Existing Ground and toggle on Use Working Alignment Definition.*

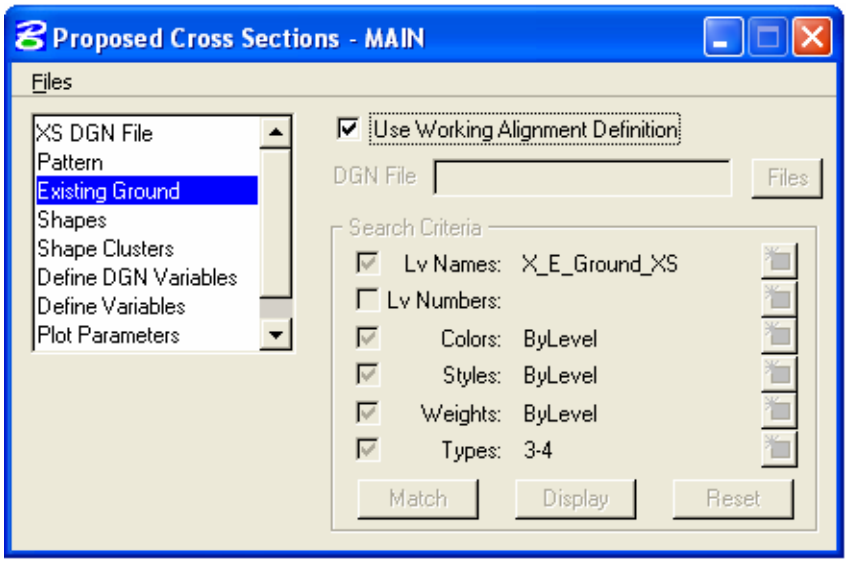

Figure 18-16 Selecting Existing Ground

9. *Select the Shapes and toggle on Use Working Alignment Definition.*

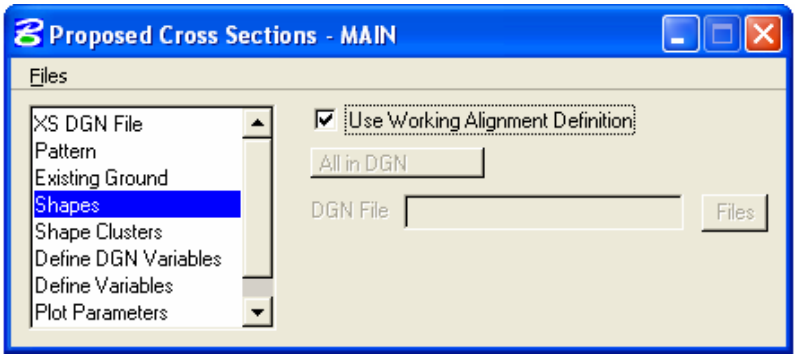

Figure 18-17: Selecting Shapes

The Working Alignment Definition toggle can be used for Pattern, Existing Ground and Shapes; these were previously defined for this working alignment. Shapes can be selected using Working Alignment definition, All in DGN, By Search Criteria, or in Shapeless Mode. Proposed Cross Sections should be run in shapeless mode for Existing Features, Existing and Proposed Right of Way, and Cross Section Labeling Typical Sections.

10. *Select Shape Clusters from the Proposed Cross Section dialog. The following dialog box will appear. Select Scan.*

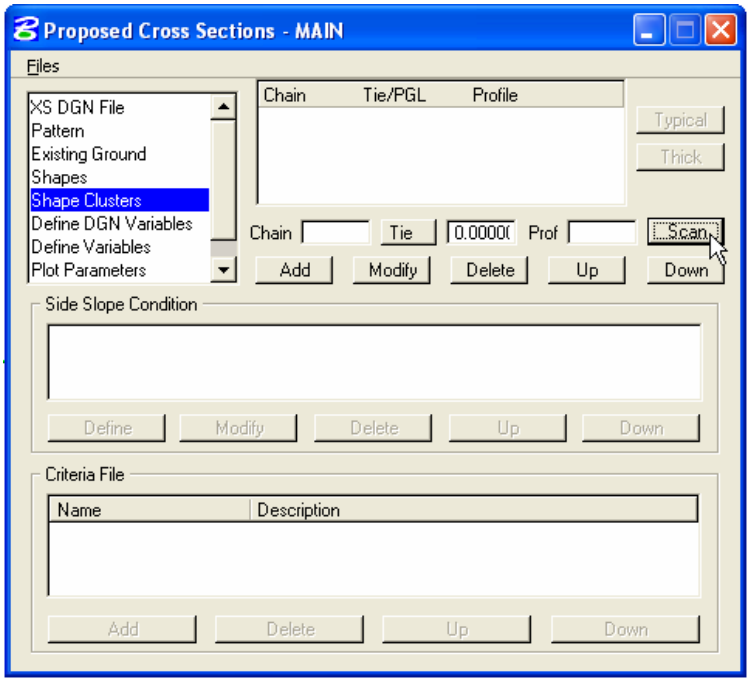

Figure 18-18: Selecting Shape Clusters

11. *Selecting Scan button will access the List of Clusters dialog box as shown below. Select the shape cluster and close the dialog box.*

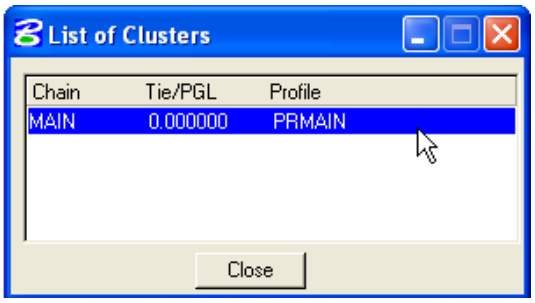

Figure 18-19: List of Clusters

12. *Select the add button from the main shape cluster dialog box to add the shape cluster to the list box as shown.*

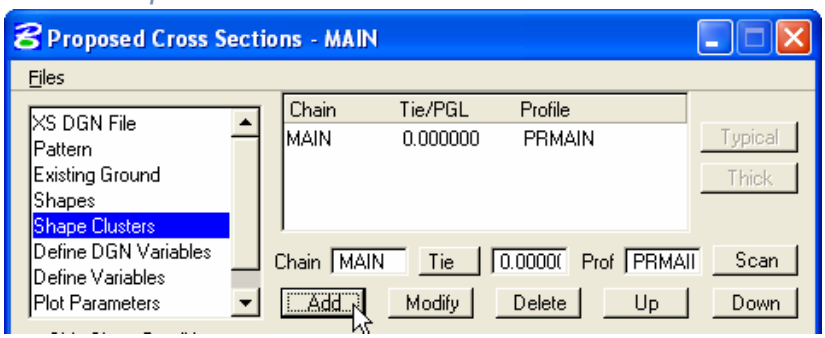

Figure 18-20: Add List of Clusters

13. *Once the shape cluster is added to the list box, highlight the information in list box shown and the Typical button will become active. Select the Typical button to access the Typical Section Generator.*

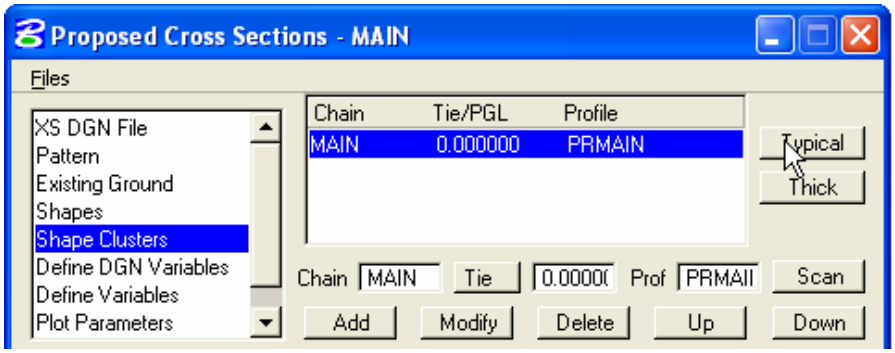

Figure 18-21: Select Typical Section

14. *Through the Typical Sections Generator, 6 Typical Sections are available. Select UNPAVT for undivided new pavement. In the Range window, Select Apply to Whole Chain and then Select Apply button at the bottom of the dialog box.*

If the proposed cross section need to be processed for a station range, select By Station Range and then define begin and end stations.

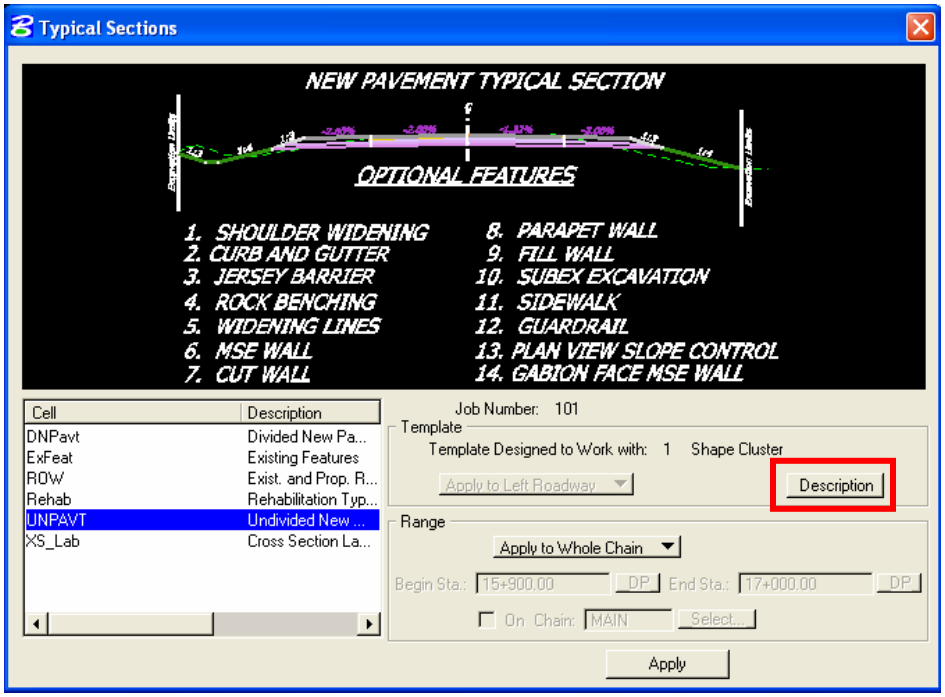

Figure 18-22: Choose Typical Section

Select the Description button in the Typical Section dialog box to access the online help for the highlighted Typical Section. Online help document provides detailed drawings and information on how each of the Typical Sections work.

The help files can also be accessed outside the Typical Sections Dialog Box. For Consultants, **Help** documentations are available through the **V8_Resource.zip** download on CFLHD Website. Help files (*.wri files) are available in the *V8_Resource\X_30\Typicals\ English or Metric directory.*

The **Help** documentations can be found on the CFLHD network at: *N:\Standards\V8_RESOURCE\X_30\Typicals\English or Metric directory.*

15. *By selecting apply in the dialog box above, the criteria files associated with the selected Typical Section is populated into the main Proposed Cross Section dialog box.*

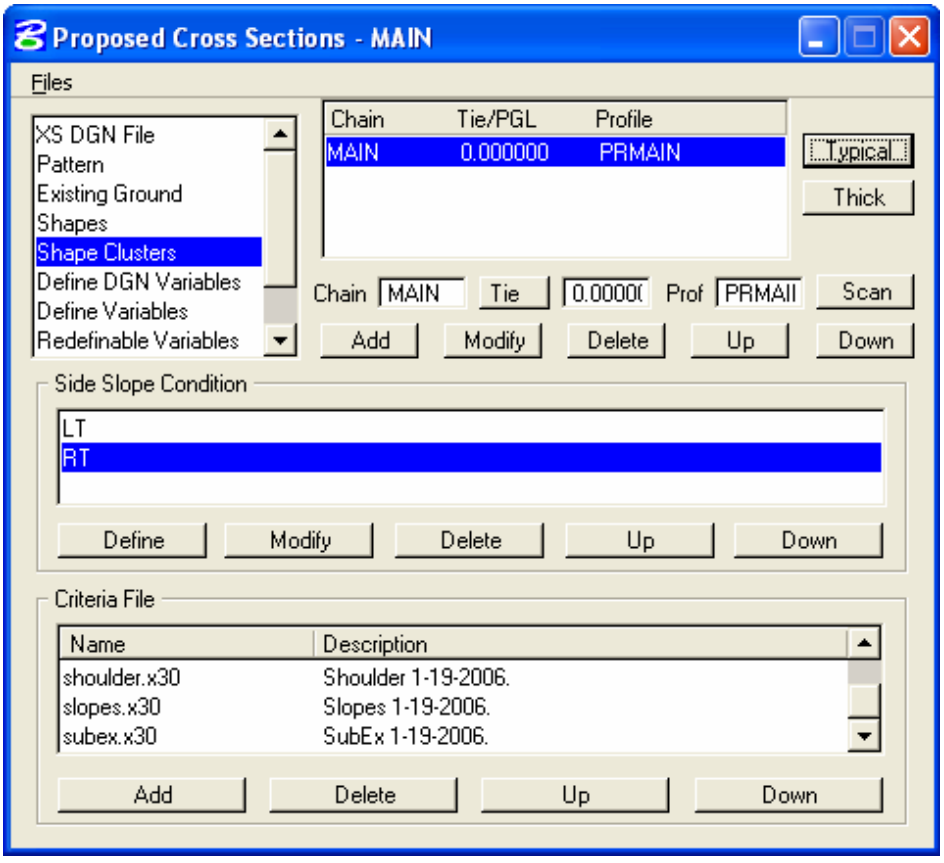

Figure 18-23: Populated Shape Cluster

16. *The Define DGN Variables should be left blank for Undivided New Pavement Typical. This variable is used only with Automated Cross Section Labeling Typical.*

17. *Select Define Variables and edit Cross Section Dgn, Proposed Plan Dgn and Geopak Lines Dgn values. Edit the default value of the variable and select Modify to accept.*

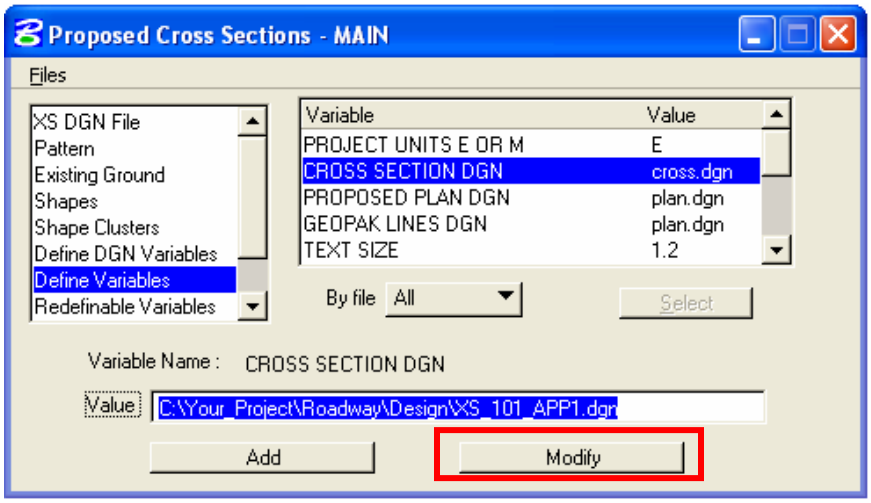

Figure 18-24: Populated Shape Cluster

If any of the dgn files are not in the working directory, the full file path must be specified. These dgn files are used by criteria to search for plan view elements.

18. *Select Redefinable Variables as shown below. Select the Edit button to modify each of the default variables and to set project specific values.*

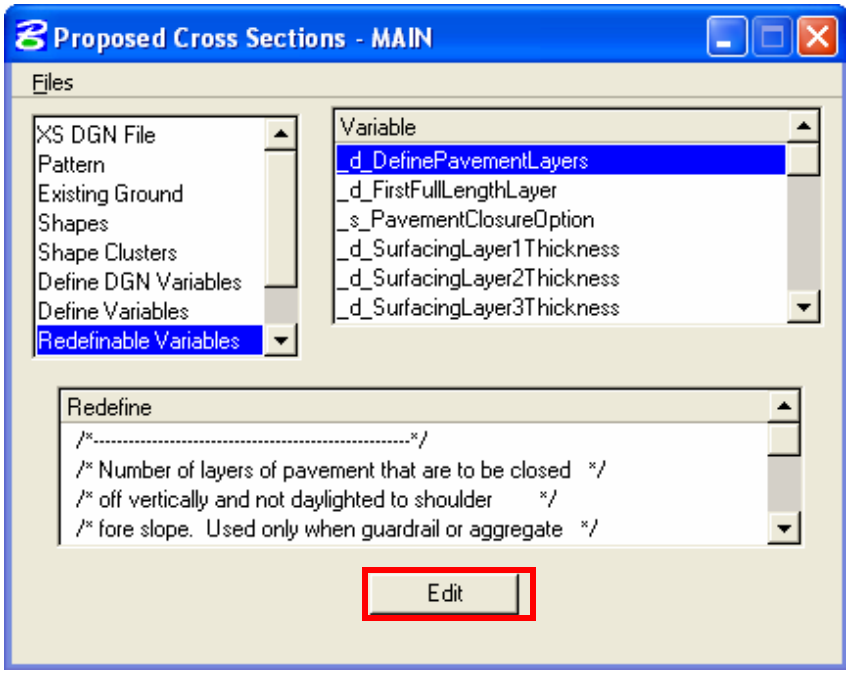

Figure 18-25: Redefinable Variables

Never remove the default syntax of "if (Sta>=0+00 R 1) then" from beginning of each of the redefinable variable statements. When editing the station ranges for the redefinable variables, make sure { and } are placed after every "if, then" statement. Station ranges should be defined in the order of the baseline stationing. "and", "or" and "not" are all valid syntax to use when editing redefinable variables.

The changes made to the define variables and redefinable variables are stored in the proposed cross section run, criteria is not being modified. Every time a Typical Section is reapplied (shape clusters populated), the proposed cross section run will be overwritten, therefore your define variables and redefinable variables will go back to default. Prior to re-applying a Typical Section, makes sure to create an input file by selecting File>Export or make a copy of the pxsprj.inp file and save as a different name. The backed up input file can be used to copy and paste project specific values to your default proposed cross section run.

19. *Select Plot Parameters and toggle off all the plot options as shown below.*

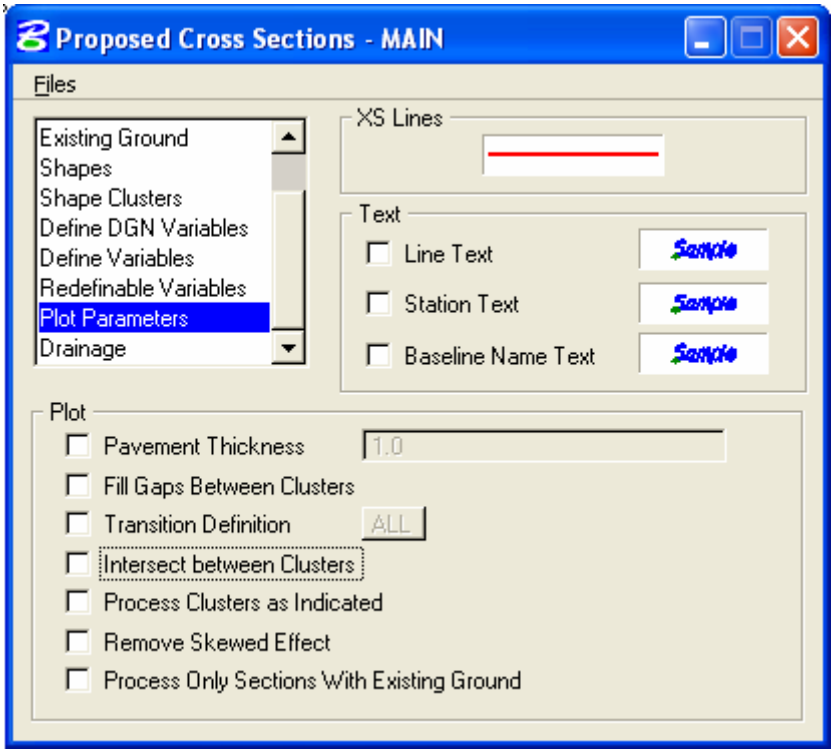

Figure 18-26: Plot options

20. *Select the drainage, this should be left blank. This will not apply to the 6 Typical Sections. Once the run has been modified for the working alignment, Select Files >Save Settings to save your run.*

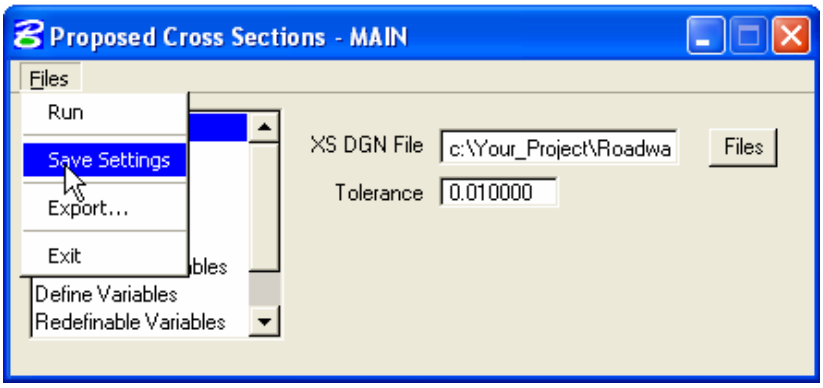

Figure 18-27: Save Settings

21. Select Files >Run to process your proposed cross sections.

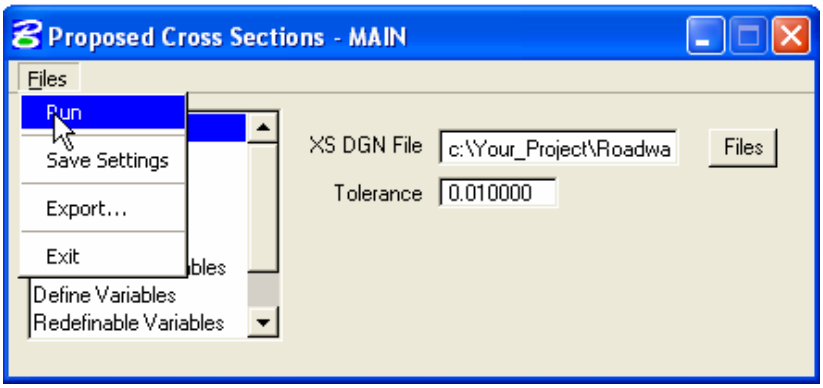

Figure 18-28: Run Proposed Cross Section

22. The following Proposed Cross Section Run dialog box will appear. Select the To Log File, change To Screen if no log file is desired. Select the Apply Button to process the proposed cross sections to your XSDGN file.

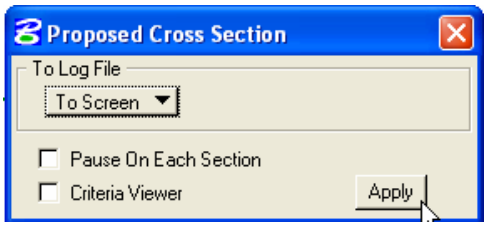

Figure 18-29: Process Proposed Cross Section

Cross Section Navigator

Now that you have completed the proposed cross section run, you will want to view them. The cross section navigator is a tool that makes the viewing of cross sections much easier. Two types of Cross Section Navigators are available to review the cross sections. The Cross Section Navigator and the Super Cross Section Navigator which allows you to view your cross section based on your profile. The Super Cross Section Navigator prevents drifting of the cross sections and provides speed controlled cross section movie navigation. Workflow 3 and Workflow 4 will outline the two Cross Section Navigators.

Workflow 3: Cross Section Navigator

1. *Select Applications>GEOPAK ROAD>Cross Sections>Navigator, or Select the Cross Section Navigator icon from the GEOPAK Road toolbar.*

Figure 18-30: Cross Section Navigator Icon

2. *The Cross Section Navigator dialog shown will appear.*

Figure 18-31: Cross Section Navigator

3. *Navigator will automatically center the first cross section found, using the station on the cross section cells.*

4. *Use the arrows*  *to move up or down station through the cross sections. You can also use the station pull down menu to go to a specific cross section.*

Workflow 4: Super Cross Section Navigator

1. *Select Applications>GEOPAK ROAD>Design & Computation Manager, or Select the Design & Computation Manager icon from the GEOPAK Road toolbar.*

Figure 18-32: Design & Computation Manager Icon

2. *In Design and Computation Manager Dialog box, select MVBA Applications>Super Cross Section Navigator.*

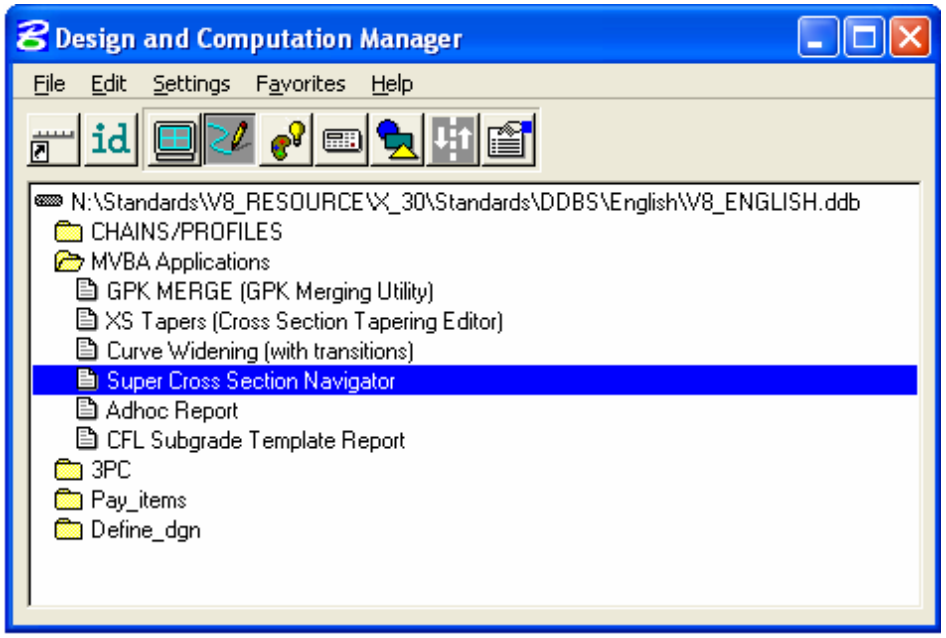

Figure 18-33: Design & Computation Manager

3. *Double Click on Super Cross Section Navigator. The following dialog box will appear.*

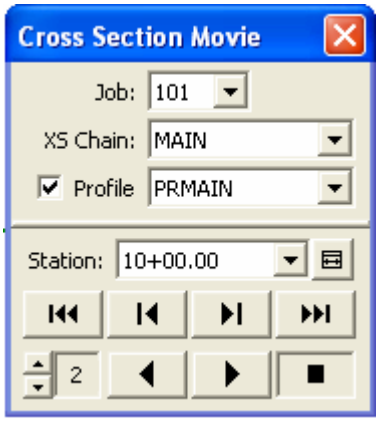

Figure 18-34: Super Cross Section Navigator

Selecting the profile and toggling on the profile will allow you to view cross section based on the profile, without drifting vertically. The speed of the cross section movie can be controlled by adjusting the number "2" shown above.

Related links: Setting up the Proposed Cross Section run for 5 typical sections using Knucklehead's Guide for GEOPAK Road 2004 Edition.

Existing Features

Right of Way

Rehabilitation (3R)

Undivided New Construction

Automated Cross Section Labeling